Chemistry

Deborah Franklin reports from Philadelphia at a meeting of the American Chemical Society

Rubber nipple risk reduced

Health officials around the world were concerned two years ago when they discovered unacceptably high levels of nitrosamines — suspected cancer-causing agents — in many baby bottle nipples and rubber pacifiers. But changes since then in manufacturing procedures have dramatically reduced the levels, according to the latest batch of U.S. and Canadian tests, described by Nrisinha Sen of Health and Welfare, Canada.

"It appears that industry has responded to the criticism," Sen says. "The problem of nitrosamines in nipples and pacifiers is being solved." In another study that may reassure parents, Sen and colleagues found that certain foods seem to prevent the formation of additional nitrosamines in the infants' stomachs, further reducing any health risks.

In 1982 U.S. Food and Drug Administration (FDA) tests, trace amounts of nitrosamines, produced by chemicals added during rubber production to improve the nipples' strength and resiliency, were found to migrate into the milk or juice in the bottle at levels that reached as high as 390 parts per billion (ppb). Canadian findings were similar. While both regulating agencies stressed that they never found evidence that any infants were harmed through the use of the nipples, stringent standards were drawn up as a precautionary measure.

Current U.S. regulations restrict levels to 60 ppb, and the Canadian cutoff is 30 ppb. Beginning in 1985, no more than 10 ppb will be permitted in either country. The latest findings indicate that manufacturers should have no trouble meeting the new standards, Sen says.

To test the theory that amines from the rubber might react with nitrites in the infant's stomach to form additional nitrosamines, Sen and colleagues simulated natural conditions in the stomach, after exposing nipples to various milk formulas and fruit juice solutions. Apple juice, orange juice, a soy formula and a milk-based formula all prevented the formation of nitrosamines, Sen reports, while cow's milk was less effective.

"With the foods, possibly because of the presence of vitamin C and other inhibitors, nitrosamine formation is essentially stopped, he says. "This means the nipples are much safer than previously thought."

Making the most of an eyesore

Mini-mountains of phosphogypsum are cluttering the horizon in central Florida at a rate that concerns the state fathers and aggravates nearby homeowners. More than 400 million tons of the compound — a byproduct of the fertilizer industry that is mostly calcium sulfate mixed with a bit of sand — are currently stockpiled in Florida's heartland. One billion tons may accumulate by the year 2000. "It is urgent to find different ways of converting waste gypsum into usable assets," says Wen F. Chang, director of the Phosphate Research Institute at the University of Miami in Coral Gables.

Chang suggests that many Florida roads could benefit from a hefty portion of gypsum mixed in during construction. Farm roads in particular, made primarily of sand and clay, tend to hold up well under dry conditions but wash away under the pounding force of rain and floods.

"Laboratory tests indicate that if a proper amount of phosphogypsum is added to the clay and sand mixture, the strength and durability of the roads are greatly improved," says the scientist. In areas where waste gypsum is abundant, he adds, the construction and maintenance costs of a road based on such a mixture should be much lower than those of a road built with sand and clay alone.

The laboratory findings will face a real-world test within the next year, when Polk County, Fla., paves a few miles of roadway with the experimental mix under the supervision of Chang's research team. The road will be divided into small sections, he says, each part treated with a slightly different gypsum mix to determine the optimal surface. By mixing in asphalt or other compounds to increase the road's resistance to water, a surface tough enough to withstand even heavy highway use is possible.

Chang's group has also built a prototype modular house made with 50 percent gypsum, and is exploring the material's potential in boat construction, with the aim of further reducing the stockpiles. The man-made mountains probably are more eyesore than environmental hazard, but aesthetics can be important, he told SCIENCE NEWS, as suburbs stretch closer to manufacturing plants that were once isolated. "Who," he asks, "wants to build a home next to a big pile of sand?"

French fried perfume?

If the frozen "french fries" from your local supermarket, designed to be baked at home, start tasting more like fare from the Golden Arches, you can probably thank a graduate student at Rutgers University.

James T. Carlin, now a researcher for Pepsico, Inc., in Valhalla, N.Y., fried 312 pounds of potatoes as part of his doctoral thesis, in search of the ingredients that make McDonalds french fries "special." Together with Chi-Tang Ho and Stephen S. Chang of Rutgers in New Brunswick, N.J., Carlin isolated and identified more than 400 different flavor compounds from the fries — 298 reported for the first time as constituents of potatoes or potato products. "Nobody had really looked at french fries before," Carlin says. As the oil and potatoes cook, several compounds given off may recombine to impart a distinctive flavor. "It's not as easy as taking a potato flavor and a fried-food flavor and throwing them together," he told SCIENCE NEWS.

Firmenich, the Swiss-based flavor company that funded the Rutgers study, apparently hopes to use the information gleaned to produce flavorful fries that contain less oil — and hence fewer calories — than the fast-food delicacy, as well as in improving the flavor of certain snack foods.

Not all the applications are in foods, Carlin says. An entirely new class of compounds he isolated in the thiazole family might be useful in perfumes. In isolation, the thiazole compounds smell flowery, he says, and not at all like fried potatoes.

Drowsiness: Nothing to sneeze at

Today, most hay fever sufferers in the United States must choose between sneezing and snoozing — all the antihistamine products on the market produce some degree of drowsiness in most persons. But within the next several years, patients may be able to choose from among a variety of potent antihistamines that are free from sedative side effects.

Some of the compounds, such as terfenadine, produced by Merrell Dow of Cincinnati, Ohio, and mequitazine, made by the French firm Pharmuka, are already sold in Europe. Others, such as the compound labeled AHR-11325 by the A. H. Robins Co. in Richmond, Va., and described at the ACS meeting, are still in the basic development stages. Though the compounds achieve the same desired effect — a suppression of allergic symptoms without sedation — they differ structurally, and may even be acting along different pathways, say the scientists studying them.

When the first few of the new generation of antihistamines were developed, scientists assumed that sedation was prevented because the compounds could not cross the blood-brain barrier. But tracing the metabolism of AHR-11325 in animals has shown that the compound is clearly getting into the brain, A. H. Robins researcher David Johnson told SCIENCE NEWS. It is probable, he says, that the drug will be effective without sedation in humans as well, though clinical studies still need to be done. Merrell Dow predicts that the first of the drugs, terfenadine, will be available in the United States by next spring.